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VARIATION IN CITY DEATH RATES IN NORTH CAROLINA

Since a recent PHSB Study—"Mortality in North Carolina Cities"—appears to have generated considerable interest if not unrest among city fathers and health officials, additional analysis of the city death rates was deemed desirable. This analysis purports to examine in greater detail than before the variation in the age-race-sex-adjusted rates (cause-specific) experienced by 38 cities during the period 1968-1972.

The previous study reported the highest and lowest city death rates with considerable differences being observed for each cause of death examined. However, the range alone does not adequately describe the variation associated with the entire spectrum of death rates. Obviously, a single outlier could be responsible for a wide range when, in fact, the other 37 rates are clustered within a very short range.

Three procedures are presently used to examine and describe variation among each of the cities' cause-specific rates:

- 1) *The coefficient of variation (CV) is a relative measure of variation and is defined as "the standard deviation expressed as a percentage of the mean." A large CV reflects greater variation than a small CV.*
- 2) *The chi-square criterion is used to test the null hypothesis of no significant differences among the 38 cities (see footnote).*
- 3) *For those causes associated with a significant chi-square (meaning that we reject the hypothesis of no difference among cities), cluster analysis is used to identify those cities whose adjusted death rates were high or low.*

Results

The CV's ranged from 12.4 for total cancer to 122.5 for hypertension. Arteriosclerosis, ovarian cancer and stomach cancer ranked behind hypertension as the causes associated with the greatest amount of variation. The CV's for these and other causes are given in Table 1.

Table 1 also contains the cause-specific chi-square values and their levels of significance. Note that some low and non-significant chi-square values ($p > .05$) are associated with a relatively large CV. This is because, despite large variation, the numbers of deaths involved are not sufficiently large to obtain statistical significance. In this sense, event frequency is highly important to the detection of significant differences.

For those causes associated with significant chi-squares ($p < .05$), Table 2 identifies the cities whose adjusted death rates were deemed by cluster analysis techniques (Statistical Analysis System) to be high. The cities listed are those whose death rates were at the highest level when we arbitrarily chose to cluster the 38 cities' cause-specific rates into five groups. The five groups may be considered to categorize death rates according to such labels as low, medium low, medium, medium high and high.